Exploration of Online-Offline Flipped Classroom Teaching Mode: An Example of Medical Imaging

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Keywords: online-offline; flipped classroom; teaching mode; course construction

Abstract: Firstly, the combined online and offline flipped classroom teaching mode is introduced, and course design and organization issues are analyzed in terms of online and offline course construction. The implementation process of the combined online and offline flipped teaching is introduced from the aspects of before, during and after class, and finally the effect of teaching practice is illustrated through the comparison of students' performance.

1. Introduction

After the outbreak of the new coronary pneumonia epidemic, colleges and universities have made extensive use of the Internet to carry out online teaching, and a variety of high-quality educational resources, new types of teaching media, and network teaching platforms have emerged rapidly, which has brought a great impact on the traditional classroom teaching, and people have begun to slowly accept and become accustomed to using the Internet to carry out learning. After the resumption of classes in colleges and universities, the combination of online and offline teaching mode has become an important trend in teaching in colleges and universities.

Flipped classroom is an emerging classroom model in the field of education, which is translated as, and can also be called "upside down classroom", refers to the rearrangement of the time inside and outside the classroom, the teacher no longer in accordance with the traditional mode of classroom teaching, but to give the initiative of learning to the students [1]. With the arrival of the information age, this teaching mode has received great attention. The biggest advantage of the flipped classroom is that it first reverses the two necessary processes of knowledge learning and knowledge internalization, first letting students preview the content of this course, and then answering questions and solving puzzles based on their own learning, which can help students enhance their subjective initiative and improve their ability to learn on their own [2].

2. Online and offline flipped classroom teaching model

The flipped classroom teaching mode that combines online and offline mainly utilizes the combination of online and offline teaching methods to reconstruct the learning process, with teachers designing the classroom and releasing learning tasks before class. Students carry out independent learning and discussion according to the learning tasks issued by the teacher before class, and the task-oriented independent learning has a clear goal and high efficiency. In the middle of the class, the teacher guides the students to complete the digestion and understanding of the class content through class questions, PPT reports, group discussions, unit tests, reports and other forms, and to reconstruct and improve their knowledge.

2.1 Online course construction

Teachers firstly design the course as a whole and classroom design, including making a detailed syllabus and clarifying the teaching objectives of the course. Secondly, they design the content of each chapter, including the important and difficult knowledge of each chapter, teaching tasks, teaching methods, exercises and practices, and post-class tasks. Then choose a suitable teaching platform, upload the relevant course syllabus, teaching video, teaching courseware, extension

  DOI: 10.25236/lccie.2024.005

resources, post-course assignments, etc. to the teaching platform, and release the learning task points. The online teaching platform is utilized to build learning classes and teacher teams, and online teaching is carried out by constantly sorting out and enriching online resources. Taking the medical imaging course as an example, the main online teaching platforms are China University MOOC and Super Star Learning Pass. China University MOOC is open to all people, realizing learning for all. Super Star Learning Channel is mainly open to on-campus students, which contains rich teaching resources and a team of professional teachers to answer students' questions and solve their problems.

2.2 Offline course design

For offline course teaching, teachers can adopt more flexible and varied teaching methods, focusing on the guiding role of the teacher, and promoting students' deep learning to improve the teaching effect. Taking the medical imaging course as an example, problem-oriented simulation operations, thematic discussions, case studies, etc., can be used to break the monotonous teaching mode of the traditional classroom and stimulate the students' problem consciousness and innovative inquiry ability [3]. Medical imaging courses are mainly based on analyzing image images, and teachers should focus on cultivating students' ability to read and interpret films in the classroom. Take the case image as the task, guide and organize students to group reporting, after the group reporting is completed, students and teachers can ask each other questions, challenge, discuss, exchange, and promote students' in-depth understanding of the knowledge and checking for gaps. Teachers should motivate and evaluate the members who participate in group reporting, and the groups can also evaluate each other to improve students' motivation to participate in teaching.

3. Flipped Classroom and Instructional Design Online and Offline

The online and offline flipped classroom is a popular trend that constantly adapts to the current educational era, and is the result of continuous reform and improvement of the traditional teaching mode. Although it is fundamentally different from the traditional teaching mode, the flipped classroom is not the subversion and replacement of the traditional teaching mode, but the upgrading and transformation on the basis of the traditional teaching mode, and this point is a concept that should not be confused for the teaching staff [4].

The design of the online and offline flipped classroom teaching model contains three links before, during and after the class, each stage requires careful design and preparation, and it requires the mutual cooperation of teachers and students, so that the teaching effect of the online and offline flipped classroom can be fully utilized only if it is well-prepared and appropriately coordinated. The design of the online and offline flipped classroom teaching model is shown in Figure 1 below.

3.1 Pre-course phase

First, teachers make course teaching plans, prepare teaching videos, teaching PPT, case study materials, post-course exercises, reflection and discussion questions, and post these teaching resources on the online learning platform. Secondly, after completing the teaching video, students record their questions and difficulties in learning and feedback to teachers through the learning platform, and teachers summarize students' problems and questions. Finally, students' online learning is counted, and those who have no learning records or are not active in learning should be reminded and urged.

3.2 Classroom phase

The classroom stage is a collaborative process with students as the main body and the teacher as the leader. Students should play a leading role in actively asking questions, discussing, thinking and reporting, and teachers should take the lead in guiding, answering, motivating and evaluating. The classroom stage should give full play to the role of students as the main body, encourage students to participate and learn together, stimulate students' interest, think independently, and learn to analyze and solve problems [5].

3.3 Post-course phase

The post-lesson phase is mainly an assessment and summarization process for students and teachers. Students summarize and review the learning content, and should review the knowledge points that have not been mastered or mastered insufficiently, and carry out post-class exercises in a targeted manner. Teachers evaluate the effectiveness of classroom teaching, continuously optimize and improve teaching methods, and answer questions for students on the e-learning platform.

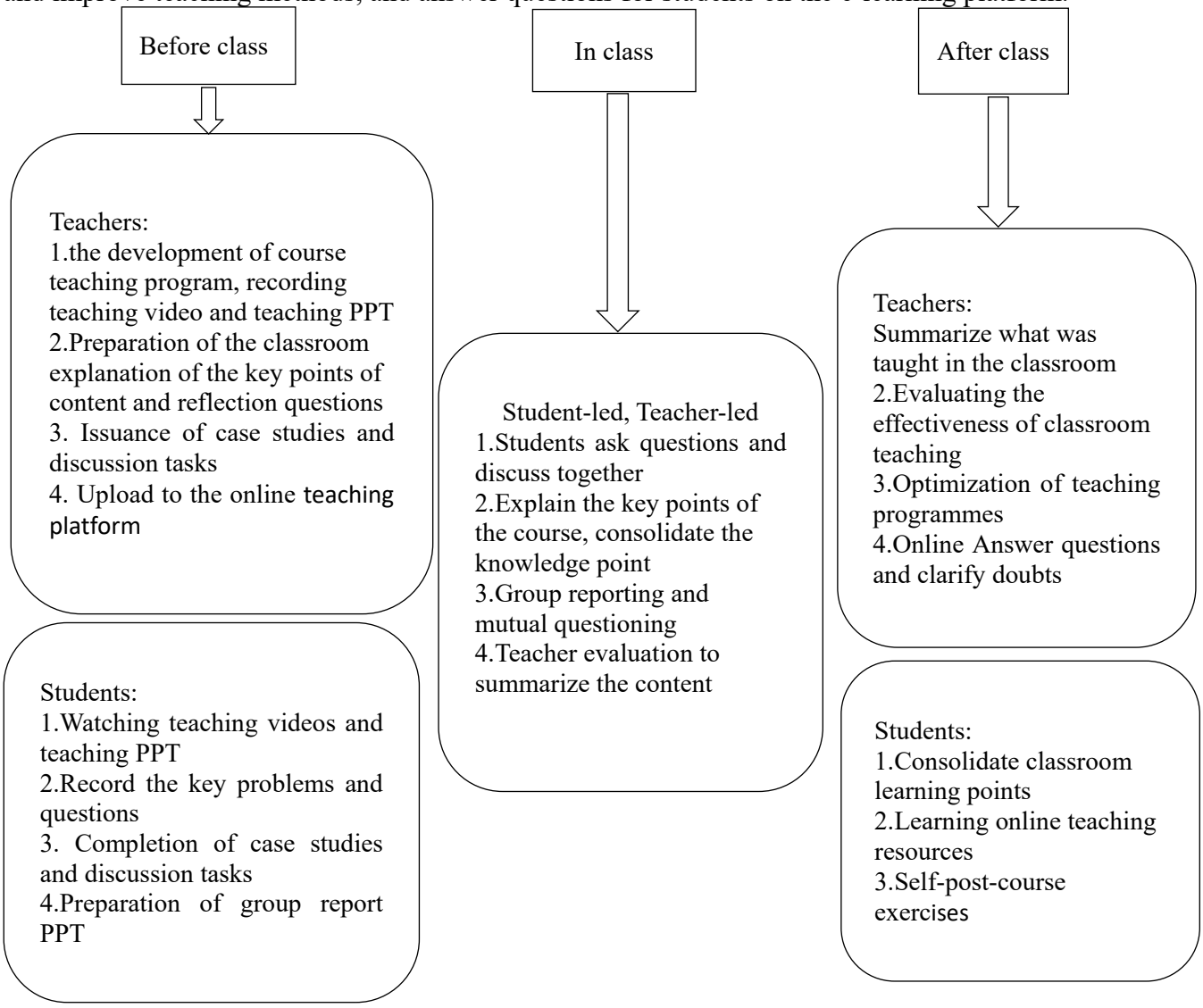

Figure 1 Design of online and offline flipped classroom teaching mode

4. Effect of online and offline flipped classroom teaching practice

In the actual teaching process, the implementation of teaching is carried out in accordance with the formulated online-online-offline flipped classroom teaching mode, allowing students to learn with problems and tasks in a cooperative group manner, using the online teaching platform to expand the spatial and temporal dimensions of learning, and to meet the needs of students' individualized learning [6]. As students have adapted to the online learning mode during the epidemic, it is easier for students to accept and adapt to the online learning mode introduced into classroom teaching after the epidemic. Compared with the traditional teaching mode, the online and offline flipped classroom teaching means are more diversified, and the classroom is no longer a single boring classroom, and the students' motivation to learn and the classroom activity is significantly improved.

Taking the medical imaging courses of 2017, 2018 and 2019 students in the School of Medical

Imaging of Nanjing Medical University as an example, the 2017 students adopted the traditional classroom teaching mode, and the 2018 and 2019 students adopted the flipped classroom teaching mode combining online and offline. From the comparison of the effect of the examination results, the passing rate, the percentage of excellence, and the average score of the 2018 and 2019 grades have increased significantly compared with the 2017 students. Detailed comparisons are shown in table 1.

Table 1 Comparative analysis of examinations

grade	score band	90-100	80-89	70-79	60-69	<60	average score	(statistics) standard deviation
2017	quorum	3	8	15	8	1	76.36	10.22
	proportions	8.57%	22.86%	42.86%	22.86%	2.86%		
2018	quorum	7	12	9	5	2	79.54	11.29
	proportions	20%	34.29%	25.71%	14.29%	5.71%		
2019	quorum	7	8	13	4	2	79.06	10.7
	proportions	20.59%	23.53%	38.24%	11.76%	5.88%		

5. Conclusion

The combination of online and offline flipped classroom teaching mode has changed the traditional teaching and learning methods, with students as the main body and teachers as the dominant, actively promoting students' independent learning, effectively utilizing the time outside the classroom, stimulating students' enthusiasm for learning, and improving students' ability to analyze and solve problems through problem-oriented classroom interaction and discussion. Although the combination of online and offline flipped classroom teaching mode has strong superiority and operability from the theoretical point of view, and has been applied to the course teaching has also achieved good results, but as a new type of product, the requirements for the ability of teachers and students have become higher, which to a certain extent impedes the speed of its development, and at the same time seriously restricts the improvement of the quality of teaching and the effect of the teaching [7].

Acknowledgement

Supported by 2023 Education Research Project of Nanjing Medical University (2023ZC071), Jiangsu Higher Education Association(2021JSJG345),2021 Project of Jiangsu Provincial Education Science "14th Five Year Plan"(B20210173).

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